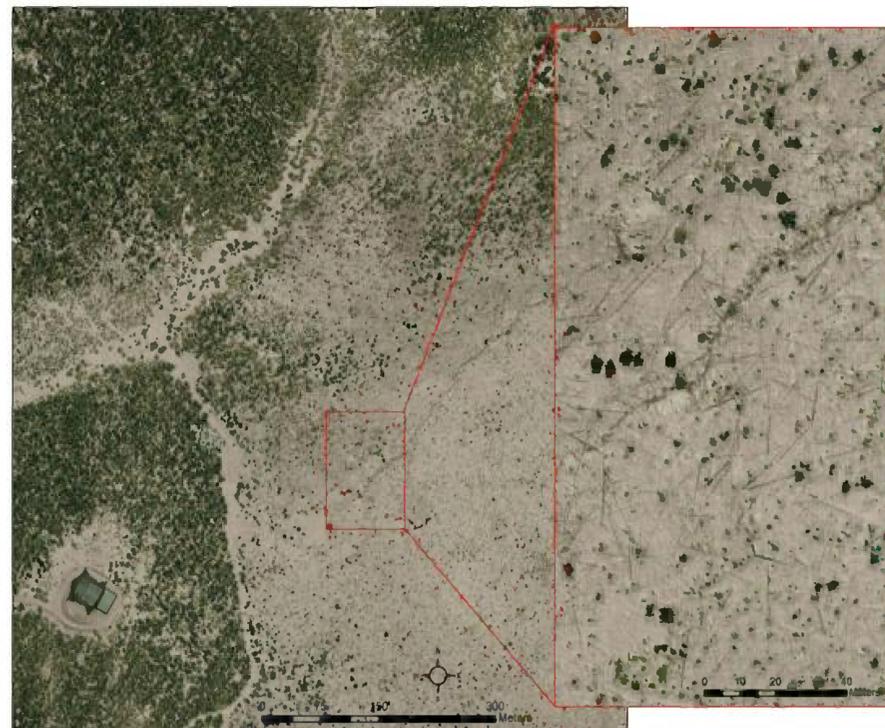


LiDAR APPLICATIONS for HABITAT CONSERVATION of ENDANGERED RED SQUIRREL, PINALEÑO MOUNTAINS, AZ

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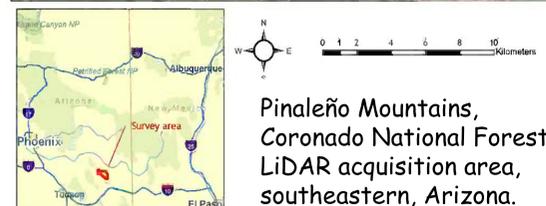
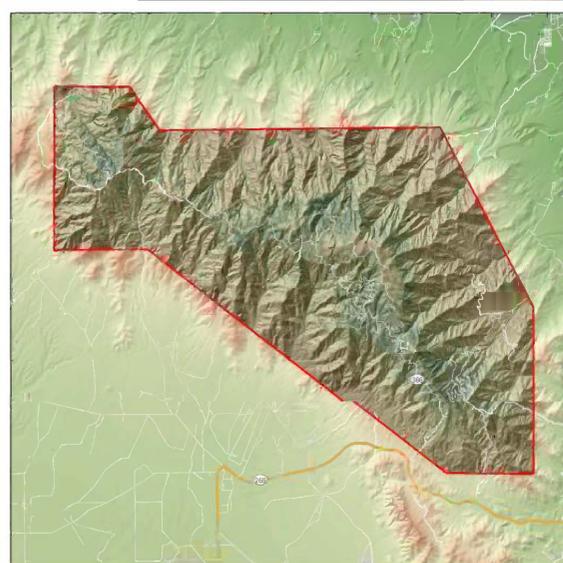
Introduction: Changes in forest composition and structure have led to large and severe wildfires and devastating insect outbreaks in the Pinaleno mountains, Coronado NF, AZ. The risk of additional wildfires and insect outbreaks has prompted a forest restoration effort aimed at habitat conservation for the Mount Graham red squirrel (*Tamiasciurus hudsonicus*) (MGRS), federally listed endangered species. Airborne LiDAR technology is being pursued as a more practical and cost effective way to derive forest structure and biomass information for this restoration effort.



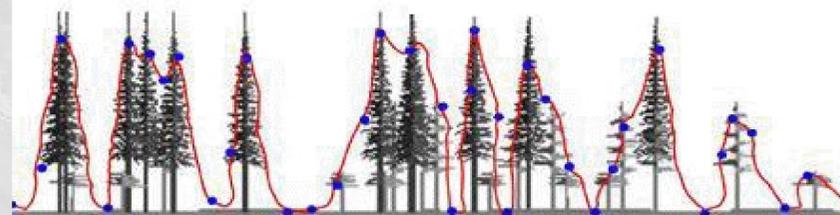
LiDAR derived image of down trees associated with the 2004 Nuttall Fire, Pinaleno Mt.

Objectives: Evaluate if LiDAR (Light Detection And Ranging, which provides three-dimensional information about a target area recording the horizontal and elev/ht coordinates) measurements can help interpret and manage forest conditions related to forest health, wildlife habitat and fire modeling, including:

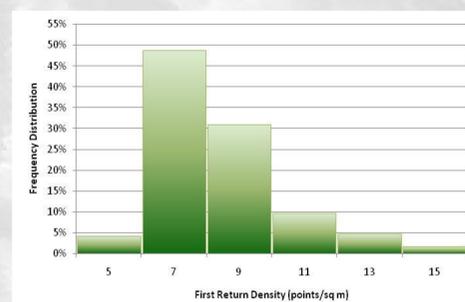
- 1) Evaluate the linkages between risk factors for Douglas-fir beetle (DFB) and fuel loading, fire behavior and the sustainability of Mt Graham red squirrel (MGRS) habitat.
- 2) Evaluate impacts of bark beetle (SB,DFB,TFB) and defoliator (*Nepytia* and spruce aphid) outbreaks and fire to MGRS spruce-fir habitat.
- 3) Develop habitat models and silvicultural treatment guidelines to support MGRS habitat restoration and recovery strategies.
- 4) Evaluate effectiveness of LiDAR in mapping root disease clusters in true firs.



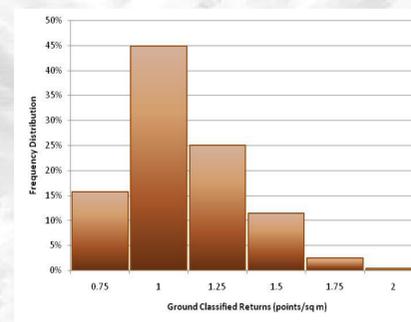
Pinaleno Mountains, Coronado National Forest LiDAR acquisition area, southeastern, Arizona.



LiDAR – light detection and ranging. Is a remote sensing system that uses laser light to determine elevation. Capable of producing three dimensional (x,y & z) images.



Density distribution for first return laser points. Average point density is 7.36 pts/m². Target was >4 pts/m².



Density distribution for ground classified laser points. Average ground point density is 0.98 pts/m².

Accomplished and Scheduled Activities:

Phase 1. Technical specifications to acquire LiDAR data developed. Acquired LiDAR data Fall 2008. Post process data sent to FS Jan 09. 2008 funding secured through;

FHM EM - \$30K, Region3 RO - \$50K, Coronado NF - \$25K

Phase 2. Develop field data collection protocol. Approximately 160 plots will be established within the study area to collect tree and site variables in support of LiDAR model development – summer 2009.

Phase 3. RSAC will evaluate acquired LiDAR and field data, apply image analysis techniques, and derive several forestry-based GIS data layers – 2009. LiDAR derived layers will contribute or allow for finer grained mapping of MGRS habitat; assist with mortality assessments; provide data layers that comply with established fire model parameters; and help generate VS generate FVS tree list information.

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